NETWORK USER SERVICES AND PERSONNEL ISSUES

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Network Heer Services And Personnel Issues*

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ARSTRACT

In a network environment, users are remote from the computer center. User services personnel, being the initial and possibly the only contact, represent the computer center to the users. Conversely, they must represent the view of the users to exert the proper influence on the operation of the computer center. With timesharing, users have close contact and scrutiny of system software. This "user intimate" software should be developed and maintained by user services. Personnel issues for this expanded user services are discussed: staffing, organization, recruiting, training, appraisal and work satisfaction.

INTRODUCTION

User services personnel traditionally include new and junior consulting and application programmers and input/output clerks, especially for batch (and remote batch) oriented computer centers. With timesharing, a heavier burden is placed on user services personnel since system or programming problems are brought to the attention of the users immediately. No longer is there a time lag between the occurence of the problems and the user's awareness of the problems; the protective umbrella of batch operations is not available. Consulting is more hazardous since the suggestions from the consultant can be tried and proved or disproved by the user immediately. No longer is there time for the consultant to sit back and leisurely study the user problem and come up with reasonably good answers, suggestions or excuses. Instead they are "put on the spot".

Another effect of timesharing is that users are placed in much closer contact with system utilities, such as text editors, interactive graphics and language processors (compilers and loaders). These utilities now

must incorporate good human engineering for user interface. Since programming is an art, the user interface aspect can have as many diversified interpretations as any artistic creation. It is a practical impossibility for a program to have an absolutely precise and easy-to-understand user interface. The best we can hope for is that the interface be designed to accommondate the majority of the user population. Knowledgeable guidelines on these "systems" utilities must be provided by user services personnel since they are the primary interface with users.

With computer networks, users are physically remote from the computer center. Frequently the only "knowledge" the users have of the computer center is based on contacts with user services employees. It is not unreasonable for a user to judge the computer center staff based on experience with user services personnel. The remoteness of the users dictates that most communications must rely on the telephone. This heavy reliance on the telephone induces problems. First, there is a tendency to be impersonal since the other party is only a voice. Secondly, when the phone is busy, out of order or if there is no answer within a reasonable time, the user can be frustrated, especially if his project deadline is drawing close. It is no longer possible to walk across the hall to query someone. Repeated dialing of 11 digit long distance numbers can be trying on both the finger and temper. Thirdly, user services personnel must determine what has gone wrong when a user reports a problem over the phone. For example, with erroneous graphics output, does the problem lie with the user program? Or is it caused by system graphics utilities and libraries? Are there hardware problems with the user's graphics terminal, terminal interface, communications lines/processors or the concentrator?

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We shall define user services for a computer network. Based on these services, personnel issues on staffing, organization, recruiting, training, appraisal and work satisfaction will be discussed.

NETWORK USER SERVICES

Network user services denote the set of services provided remote users by the central computer center. This set includes all user services for nonnetwork users. There is no need to concern ourselves with the different types of network configurations. The most basic one, the "star" configuration, will be assumed. In this case, the computer center is the central point of a star, and user access is represented by peripheral points surrounding and connecting to the center computer(s). Obviously a peripheral point can itself be the center of a peripheral timesharing subsystem. Without loss of generality, we also include batch and remote batch services as part of timesharing since most batch jobs simply run in the "background" and timeshare with interactive iobs.

The user population will be characterised as:

- The users are capable of at least basic programming and not ignorant,
- 2. They may be very busy with their work so that they may not have time, patience or inclination to read all documentation carefully, and
- 3. They are physically distant from the computer center. As mentioned earlier, the remoteness and consequent lack of personal contact could be the seed of personal animosity which the users might develop and must be borne by user services staff.

Students without programming training are excluded. They should obtain their training from formal academic classes and should not abuse their privelege to user services (as often is the case in academic computer centers where a consultant has to be careful so as not to complete a student's programming assignment). Student users otherwise are treated like regualr users.

The services will be described for input/output/accounting, consultation, documentation, education, user relations and utilities/software libraries.

Input/output/accounting: This is probably the most traditional of user services. External data, program source, forms for the optical character reader, pictures for the digitizer, requests for job runs etc. are received and properly set up. Output listings, forms, pictures, fiche, films, slides etc. are distributed. The setup of new accounts and users, changes and closeouts, accounting reports, charges and other user administrative aids are duties within this area.

Consultation: Consultation has evolved to be the most important task of user services. It is also the most difficult area to staff. Consultation involves advising on the use of a wide variety of software, both systems and applications, explanation of center policies and operations, proper diagnosis of user complaints and user programs to determine whether difficulties are due to system software or user mistakes. On the last point, it is interesting to note that "to err is to be human". Some users tend to be very human in jumping to conclusive accusations that their problems are caused by system bugs.

Documentation: User services personnel must ensure that software manuals are always up-to-date and readily available. There is really only one way to achieve this for computer networks. The documentation system has to be online. Mailing hardcopy manuals and updates involve obvious problems of time lag; the manuals and updates must be printed and then distributed. Then users are burdened with adding and replacing pages, even for software manuals that are seldom used. The responsibility of making sure the users have the most up-to-date information in their possession has rested on the computer center. Users play only passive roles. As new users come on board, they are given (or they request) all software manuals available and their names are maintained on the list for future updates and new issues. Sadly, and wastefully, only a subset of the manuals is needed.

What should happen is that users be allowed to play more active roles. They should print manuals when they need them. Even better, they should view those parts that are of interest to them. An online documentation system makes this possible. The user can print copies of manuals at remote site printers readily. More importantly, the online system allows and helps him locate sections describing the area of software he is interested in, right at his terminal. In this sense, printing is unnecessary. Users hog manuals because they are afraid that they might need the information one day, in the middle of the night. Once they are assured that the most up-to-date information is available 24 hours a day at their finger tips, their inclination to print manuals will fade. After all, who wants to clutter up one's office with manuals that are usually not aesthetically pleasing.

With online documentation systems, the actual production and updating of a document is usually automated. This obviously does not include creative writing. It involves text editing, formatting, cataloging. The use of computer programs may not be acceptable to some writers who may frown upon such "noncreative" activities. Others may enjoy toying with the computer and readily employ (and demand) good computer software to supplement their creative activities. The latter, less prejudiced, will be preferred for computer documentarians.

Some chores involve basically bulk typing. An example is the production of externally produced documenation such as manufacturer-supplied manuals. It is imperative that updates and modifications by the manufacturer be handled reasonably easily. In this respect, a word processor (person) should be employed to do the bulk typing. This person should be capable of learning to use text editing and formatting utilites. (Bulk typing chores can sometimes be handled with OCR equipment.) This way, manufacturer-produced changes can be incorporated by the word processor.

User relations: User relations is described also as public relations [WAD78]. It is important to keep user communication channels open [WEN78]. As the first contact for a computer network where many users may have never seen the center, user services has the undeclared duties of public relations. The more obvious responsibility will be the publication of newsletters or magazines, probably every month. The usual contents include work in progress, news and tidbits, machine utilization and various statistics, scheduled events, detailed reports (technical, administrative and informational) and educational articles. It serves as the formal channel to broadcast information to remote users. More urgent communications on the network are sent through the NEWS utility whereby announcements and bulletin are made available. Key user site contacts are to receive these NEWS items everyday through remote site printers and distribution systems. Both the monthly magazine and NEWS utility are used for public interest events. Occasions may arise where only certain users must be informed (e.g. a user monopolizes too much disk space). Personal phone calls and the MAIL utility are used. Slightly less frequently, site visits by user services personnel should be planned. Lectures on software heavily used at the site should be given. More importantly, this assures both the staff and the users that there is indeed a face associated with that voice. This helps keep the communication channel open. It is also much easier to solicit input from users at the site and to appreciate the frustration and problems remoteness might cause to the users. Finally, another user relations duty is conducting user group meetings to encourage dialog and communication among users and center staff.

Education: The goal of education is to help users be self-sufficient. The duties basically involve preparing and conducting classes, and topics should stress areas where users have many questions and problems. User suggested topics should be included. (For a more detailed discussion on education from service suppliers, please see [GRA78].) General interest lectures should be given by user services personnel. Lectures on software utilities and libraries should be given by the responsible programmers. This makes the user aware that software he has been using does have

a human creater, while the programmer gets a feeling (good or bad) for the usage of his creation. The dialog helps make him a more user oriented programmer. Another approach to user education is online training (see [CAR78]) and information retrieval. Computer aided (augmented) instruction is well known. However, its development awaits the maturity of natural language question answering systems. still a research area in artificial intelligence. A less ambitious approach is to employ basic information retrieval technology and couple it with a simple data base system. Experience from user interactions will help build this system to help other users learn operations of "system" software.

Utility and software libraries: This is probably a nontraditional user service. Many traditional system programming assignments of utility and software libraries will be the duties of user services (a step further for the "teaming up with system programming" addressed by Secrist [SEC78]). This set of software is used directly and frequently by users, and includes user callable i/o routines, file manipulation, mathematical functions, conversion routines, output utilities, text editors, job control processors, batch processing, tape utilities and data base managements etc.. Excluded are operating system core programs such as scheduler, memory manager, network communications processor, spooler etc.. Language processors such as compilers, assemblers and loaders fall into the grey area. This set of software has been much studied for efficiency, error processing (possibly with human engineering consideration) and linguistic clarity. There should be a language processor group supported by both the operating systems and user services groups for machine-optimum and user-oriented language processors. Applications programming, be they statistics packages, engineering design systems or inventory control programs, probably can be considered an integral area of user services. However, these types of programming may be quite specific for certain user needs and probably should be assigned to a separate group.

STAFFING

The user services described encompass traditional user services and parts of traditional system programming assignments. It could have been called user systems or user service systems. The assignment is to provide good user services through programs, documentation or personal contact. The staffing requirements may be discussed based on the following three areas: input/output/accounting, documentation/technical writing and consultation/programming.

Input/output/accounting: This is an area where relatively junior or new programmers can be assigned. College experience with at least an associate's degree is preferred for

professional maturity. Course work in basic programming and accounting will be useful. Most input/output/accounting procedures are automated. However, these procedures are frequently subject to modifications due to changes of user population and government/corporate policies and regulations. Programs to automate these procedures should be written and supported by staff in this area.

Documentation/technical writing: This area commands effective written communication. Degreed personnel in English or related disciplines will be needed. While the formal training is in English and writing, experience in computer terminology will be essential. Course work in Computer Science will be preferred. Boylan [BOY79] advocates that documentarians debug utilities based on documentation given by a programmer. This is a rather idealistic approach requiring that a documentarian also be a programmer to debug nontrivial programs. I believe that documentarians should not be programmers because they have the very important duty of ensuring documentation is reasonably comprehensible by those with formal training in fields other than Computer Science. Documentarians should be encouraged to have direct contact with the users (i.e. they "consult" also) to get some idea on how documentation is received by the user community.

While software changes are the responsibility of the programmers, documentarians must monitor change announcements to ensure that documentation is up-to-date. It should be a computer center policy that no software (and software changes) be released without proper documentation (changes). The documentarians are given the authority to make sure that documentation is both up-to-date and up-to-par. This includes the possibly difficult task of pointing out the deficiencies in documentation produced by programmers.

Consultation/programming: The consultant, as a user contact, is viewed as the spokesman for the computer center by the users. His attitude, knowledge etc. is usually taken as the attitude, knowledge etc. of the center staff. At the same time, as an interface with the users, the consultant must transmit requests and problems from the users to the center. This may at times involve pointing out shortcomings of programs written by others, not an easy task. Regular meetings where problems are discussed publicly is a good way to minimize personality conflicts and keep everybody informed.

What qualifications should a consultant have? Obviously a nonprogrammer will not make a good programming consultant. Less obvious, a consultant should be an experienced programmer. Sadly, but frequently true in many installations, the most junior, new or trainee programmer is put in the consultant's chair.

Some of the reasons given are: "While he is learning the system or learning to program, he should interact with the users" or "He cannot be placed anywhere else since other system assignments are too important or vital for a green employee". While this practice can be justified on many a convenient excuse, the users, the employee and the center all suffer. In a network environment, the users, being remote, expect the consultant to "know everything". While "knowing everything" is an impossibility, to discover that the consultant may know even less than they do is indeed a big shock to the users. When the users cannot get satisfactory help, the image of the center with competent staff suffers. The adverse perception of the center's ability to serve the users may eventually come back to haunt the center in the form of erosion of financial and other supports from the users. The new employee suffers too: it is difficult to see how he can learn the system "from the user". Equally impossible to comprehend is the expectation that the user will "teach the consultant". Some users may be less conservative with their opinions when their problems or questions are not taken care of expeditiously. For a new employee, this can be an ego shattering experience. With less confidence in the contact, users may not be inclined to report problems. Or problems reported by users may not be recognized by the new consultant, or he may be too timid to press the case for the users. The net result is that the center slowly cuts off its communication link with the users. The point is that consultants should not be new employees.

What are the requirements of a user services consultant? The basic point to remember is that he is alone when he answers the phone; he is put on the spot for what he knows or does not know. A consultant should have broad knowledge of computer science and be familiar with the software and policies of the center. He should have good telephone manners positive attitude, patience and incisive instinct to diagnose user problems. It probably would help to have sympathetic ears, a happy disposition and an optimistic outlook. In other words, if he has to deal with human users, he should have a "very human" personality. However, being a nice person does not a consultant make. This must be complemented with the ability to guide the user to solve his problem. It will be very convenient for a user to call up and say "My program bombed. I think the system caused it. I'll give you all the files. Maybe you can find the bug for the system people." It is imperative that the consultant show the user how to use debugging aids to find his own bugs or to reasonably show that there is a system bug. This is probably the most difficult task for consultation. It requires the skill to diagnose sick programs via long distance conversations: incisive questions to bring out the proper answers, precise and simple experiments to extablish or eliminate various

possibilities and, at times, artful remarks that the user caused the problem.

The idea that programming and consulting are inseparable is important for the programming of utilities and software libraries that directly interface with the users. The majority of user consultation will be for this set of software. Based on user feedback, the consultants are in the best position to maintain these utilities/libraries. The alternative would be for the consultants to report the experience and problems through the proper form and procedures, a process that represents an extra level of work, rules and redtape. More likely, the less serious but irritating problems and requests for better human engineering may not be reported, thus bleaching the confidence of the users. This argument can be carried further to the position that consultants should write the utilities/libraries. There are other advantages to this approach. We have discussed the benefit where the utility programmer actually consults (and teaches) his program and updates it based on actual feedback. This approach will help staffing problems for user service. As programmers, consultants cannot be deprived of the joy and challenge of programming so that he can spend full time consulting. For career considerations and work satisfaction, programming consultants must have regular programming assignments, be they individual projects or part of a big team project. One of the most obvious goals will be to write programs to alleviate the consultation load.

PERSONNEL ISSUES

Personnel issues will again be based on the three areas of input/output/accounting, documentation/technical writing and consultation/programming for organization only. Beyond that, we shall use the consultant to represent all user services personnel for convenience. For organization, there should be a director of user services with overall responsibilities. Each of the three areas should be under the guidance of a lead programming consultant. The input/output/accounting area leader will be responsible for the proper function of his area and provide programming support and training. The documentation/technical writing area leader is responsible for setting priorities for various documentation projects. He may have to shoulder any criticism and justify the assignment priorities. He also will provide programming support for the online documentation system, and supervise other programming consultants assigned to support text editors, formatters, etc.. There should be a lead documentarian who will be responsible for the quality of documentation produced, training and evaluation of other documentarians and the word processor. The remaining programming consultants may be under the immediate guidance of the director. It is possible to establish more areas, e.g. for

libraries (software) and general utilities, depending on the number of available people. It is advisable to have a coordinator/leader for each group of five to eight people.

Recruiting of consultants may be a challenge because of the traditional stigma of user services and because of the current short supply of systems programmers. Qualified consultants will probably be more attracted to "systems programming". Until user services becomes more accurately defined and known as user systems, recruiting probably will be difficult.

Training of consultants requires on the job training, under the direct guidance of an experience consultant. It may be a good idea to let the users know about the new consultant so as not to erode their confidence. This can be complemented with other training aids [DAY79].

Compensation of consultants is a rather difficult subject. If compensation is based strictly on demand and supply, the short supply of programmers makes it necessary to provide very high compensation. In terms of relative compensation measures, it may be argued that a good consultant must be a good programmer, but a good programmer may not necessarily make a good consultant. Compensation for documentarians does not appear to show a very competitive scene, rather surprisingly. This may change as online documentation becomes m re universal since the number of qualified documentarians does not appear to be high.

Appraisal for user services personnel is not difficult. Techniques exist for objective assessments (e.g. see [KEL75], [BLU76]): getting projects done on time, writing "bugfree" programs (relatively anyway), well written documentation, minimal procedural mistakes etc.. The most important appraisal criterion though is user happiness. This may be assessed with the following:

- competence, measured subjectively during regular interaction without resorting to formal tests and examinations,
- consultation skill (other than technical competence), measured in terms of conscientiousness of consultation hours, report of user experience and methodological followup to ensure that user problems are not filed and forgotten, and
- 3. effectiveness, the acid test measured in the amount of changes in computer center policy, software and documentation that can be attributed to the consultant based on his interactions with users.

Work satisfaction is important in any organization to provide good service. Consultation in a network environment dictates that the consultant sit by the telephone within scheduled hours. However, many programmers may feel stymied by becoming a 9 to 5 worker. Programming is an art. A true programmer is

like an artist. He is responsible for his work 24 hours a day. His creativity does not abide by the 8-hour day either. To insist that he be tied to his desk or phone all the time is about the best way to ask for his retirement. A consultant should spend only about one quarter of his time consulting. The remaining three quarter time should be spent programming (design, implementation and documentation). Work happiness can be improved with proper job (assignment) mix and challenge.

FINAL REMARKS

We have expanded traditional user services to include systems programming for computer networks. Consultation is complemented with automated systems to make information readily available. It should still be noted that users would rather call to save their time even if information is readily avaliable [WIL77]. Consultation should be directed toward helping the users help themselves. Experience from interactions with users should be employed to provide future software systems to lighten the load of consulting. From a personnel point of view, it is true that consultation turns many programmers off, making traditional user services the least attractive area to enter. With the network user services described, consultants are given an assignment mix of various "systems" programming tasks which directly interface with users. This approach appears plausible to enhance both user happiness and work happiness.

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